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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/063,575	05/03/2002	Ho-Ming Tong	8318-US-PA	9757

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JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
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EXAMINER

VU, QUANG D

ART UNIT PAPER NUMBER

2811

DATE MAILED: 04/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/063,575

Applicant(s)

TONG ET AL.

Examiner

Quang D Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2004.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-34 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 13-34 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 13-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,508,229 to Baker in view of US Patent No. 5,767,010 to Mis et al., and further in view of US Patent No. 6,521,996 to Seshan.

Regarding claim 13, Baker (figures 2A-e) teaches a chip structure having bumps, comprising:

a silicon chip having an active surface with a passivation layer (34) and a plurality of bonding pads (32), wherein the passivation layer (34) exposes the bonding pads (32);

an adhesion layer (36) over the bonding pads (32);

a barrier layer (38) over the adhesion layer (36), wherein material forming the barrier layer is nickel-vanadium alloy (column 3, lines 28-29);

a wettable layer (40) over the barrier layer (38), wherein material forming the wettable layer includes copper (column 3, lines 32-33); and

a plurality of solder bumps (48) over the wettable layer (40).

Baker teaches the aluminum bonding pads (32) (column 3, lines 12-13). Baker differs in not showing the copper bonding pads. The copper bonding pad is known in the art as shown for

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example by Mis et al. (contact pad [24]; column 3, lines 53-57). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select the copper contact pad, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use. In re Leshin, 125 USPQ 416.

Baker and Mis et al. differ in not showing the material of the adhesion layer is titanium-tungsten alloy. However, Seshan teaches the material of the adhesion layer (224) is titanium-tungsten (column 3, lines 44-51). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was to incorporate the teaching of Seshan into the device taught by Baker and Mis et al. because it provides good adhesion.

Regarding claim 14, Baker and Mis et al. differ in not showing the adhesion layer having a thickness between about 800 Angstroms to 2000 Angstroms. The thickness of the adhesion layer is a known variable, which is subject to routine experimentation and optimization. Seshan shows that it is conventional to form adhesion layer with thickness of about 200 Angstroms to 1500 Angstroms (column 3, lines 46-47), which is in the claimed range. It would have been obvious to one having ordinary skill in the art at the time the invention was made for the adhesion layer having a thickness between about 800 Angstroms to 2000 Angstroms, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 15, Baker teaches the barrier layer (38) having a thickness of approximately 2 kilo Angstroms (column 3, lines 28-29).

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Regarding claim 16, Baker teaches the wettable layer (40) having a thickness of approximately 4 kilo Angstroms (column 3, lines 32-33).

Regarding claim 17, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 13 above. Seshan teaches the material of the adhesion layer is chromium (column 3, lines 44-51).

Regarding claim 18, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 14 above.

Regarding claim 19, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 15 above.

Regarding claim 20, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 16 above.

Regarding claim 21, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 13 above.

Regarding claim 22, Baker teaches the material of the barrier layer is nickel-vanadium alloy (column 3, lines 28-29).

Regarding claim 23, Baker teaches the material of the wettable layer is copper (column 3, lines 32-33).

Regarding claim 24, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 21 above. Seshan teaches the material of the passivation layer is polyimide (column 3, lines 28-31).

Regarding claim 25, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 14 above.

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Regarding claim 26, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 15 above.

Regarding claim 27, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 16 above.

Regarding claim 28, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 17 above.

Regarding claim 29, Baker teaches the material of the barrier layer is nickel-vanadium alloy (column 3, lines 28-29).

Regarding claim 30, Baker teaches the material of the wettable layer is copper (column 3, lines 32-33).

Regarding claim 31, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 28 above. Seshan teaches the material of the passivation layer is polyimide (column 3, lines 28-31).

Regarding claim 32, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 18 above.

Regarding claim 33, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 19 above.

Regarding claim 34, Baker, Mis et al. and Seshan apply to this claim as discussed regarding claim 20 above.

Response to Arguments

Applicant's arguments filed 01/16/04 have been fully considered but they are not persuasive.

It is argued, in page 3 of the remarks, that Baker, Mis et al. and Seshan do not teach or suggest the three metal layers are etched during one step. This argument is not convincing because the claimed limitations of claims 13-34 do not show the three metal layers that are etched during one step.

It is argued, in page 4 of the remarks, that the combined device of Baker, Mis et al. and Seshan does not teach or suggest the claimed limitations of claims 13-34. This argument is not convincing because the combined device (Baker, Mis et al. and Seshan) shows the claimed limitations of claims 13-34 for the reasons that are discussed above.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quang D Vu whose telephone number is 571-272-1667. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

qv
April 8, 2004

Quang D Vu
Examiner
